

CLAIMS

What is claimed is:

1. In a Home Agent that supports Mobile IP, a method of registering a Mobile Node without assigning an IP address, the method comprising:

5 determining whether the Mobile Node requires an IP address using a first indicator in a registration request packet;

 when it is determined that the Mobile Node does not require an IP address, sending a registration reply packet containing a second indicator indicating that an IP address is not assigned to the Mobile Node; and

10 when it is determined that the Mobile Node requires an IP address, assigning an IP address to the Mobile Node and sending to the Mobile Node a registration reply packet containing the IP address.

2. The method as recited in claim 1, further comprising:

15 receiving the registration request packet containing the first indicator from the Mobile Node.

3. The method as recited in claim 1, further comprising:

 generating the second indicator and appending the second indicator to the registration reply packet.

20 4. The method of as recited in claim 1, wherein the first indicator and the second indicator have an identical format.

5. In a Home Agent that supports Mobile IP, a method of looking up a Mobile Node wherein the Mobile Node has previously registered with the Home Agent to notify the Home Agent that the Mobile Node has roamed to a specified Foreign Agent, the method comprising:

5 receiving a name lookup packet for a name lookup from a lookup requester, wherein the name lookup packet includes a lookup name;

composing a lookup notification packet, the lookup notification packet indicating that a name lookup for a Mobile Node corresponding to the lookup name in the name lookup packet has been received by the Home Agent;

10 sending the lookup notification packet to the Mobile Node via a Foreign Agent;

receiving a lookup acknowledgement packet from the Mobile Node via the Foreign Agent, the lookup acknowledgement packet corresponding to the lookup notification packet; and

15 sending a lookup reply packet to the lookup requester indicating a status of the name lookup.

6. The method of claim 5, further comprising:

authenticating the name lookup packet from the lookup requester.

7. The method of claim 5, wherein the name lookup packet includes a lookup requester name.

20 8. The method of claim 7, further comprising:

prior to composing the lookup notification packet,

looking up the lookup requester name in a lookup requester table; and

when the lookup requester name is not found in the lookup requester table,
composing the lookup reply packet and sending the lookup reply packet to the lookup
requester wherein the lookup reply packet contains an error indicator indicating the lookup
name is unavailable.

9. The method of claim 5, wherein the lookup requester is a domain name
server.

10. The method of claim 5, wherein the lookup name corresponds to one or
more Mobile Nodes.

11. The method of claim 5, wherein the lookup name is compatible with a
protocol used by a domain name server.

12. The method of claim 5, wherein the lookup name refers to one or more
physical devices capable of receiving the lookup notification packet.

13. The method of claim 5, wherein the lookup name refers to a user of one or
more physical devices capable of receiving the lookup notification packet.

14. The method of claim 5, further comprising:

prior to composing the lookup notification packet,

looking up the lookup name in a lookup name table wherein the lookup name table
maps the lookup name to one or more Mobile Node identifiers.

15. The method of claim 14, further comprising:

when the lookup name is not found in the lookup name table,

composing the lookup reply packet; and

sending the lookup reply packet to the lookup requester, wherein the lookup reply packet contains an error indicator indicating that the lookup name is unavailable.

5 16. The method of claim 5, further comprising:

prior to sending the lookup notification packet,

marking the lookup notification packet pending in a lookup request table entry in a name lookup table used to track pending lookup notification packets.

10 17. The method of claim 16, wherein the name lookup table entry corresponding to one of the pending lookup notification packets contains the lookup requester name.

18. The method of claim 16, wherein the name lookup table entry corresponding to one of the pending lookup notification packets contains the lookup name.

15 19. The method of claim 16, wherein the name lookup table entry corresponding to one of the pending lookup notification packets contains a lookup lifetime.

20. The method of claim 16, wherein the name lookup table entry corresponding to the lookup notification packet contains a Mobile Node identifier identifying the Mobile Node.

21. The method of claim 16, wherein the name lookup table entry corresponding to one of the pending lookup notification packets contains an IP address assigned to the Mobile Node.

22. The method of claim 16, further comprising:

5 checking a time remaining on a lookup lifetime in the name lookup table entry corresponding to one of the pending lookup notification packets; and

when the time remaining is below a certain value, composing the lookup reply packet, sending the lookup reply packet to the lookup requester and updating the name lookup table entry from the name lookup table, wherein the lookup reply packet contains
10 an error indicator indicating the lookup name is unavailable.

23. The method of claim 16, further comprising:

after receiving the lookup acknowledgement packet,

updating the name lookup table entry from the name lookup table corresponding to one of the pending lookup notification packets.

15 24. The method of claim 5, further comprising:

prior to sending the lookup notification packet,

assigning an IP address and a registration lifetime to the Mobile Node; and

providing the IP address and the registration lifetime assigned to the Mobile Node in the lookup notification packet.

25. The method of claim 5, wherein the lookup notification packet contains a registration request indicator, the registration request indicator requesting that the Mobile Node send a registration request packet to the Home Agent.

26. The method of claim 5, wherein the lookup acknowledgement packet is a registration request packet.

27. The method of claim 5, wherein the lookup acknowledgement packet contains a registration lifetime selected by the Mobile Node.

28. The method of claim 5, further comprising:

after receiving the lookup acknowledgement packet from the Mobile Node via the Foreign Agent,

establishing a data path between the Home Agent and the Foreign Agent wherein the data path is used by the Home Agent to send data packets sent to the Mobile Node from a Corresponding Node.

29. In a Foreign Agent that supports Mobile IP, a method of looking up a Mobile Node wherein the Mobile Node has previously registered with the Home Agent to identify the Foreign Agent to which the Mobile Node has roamed, the method comprising:

receiving a lookup notification packet from the Home Agent, wherein the lookup notification packet indicates a name lookup including a lookup name corresponding to the Mobile Node has been received by the Home Agent;

forwarding the lookup notification packet to the Mobile Node; and

receiving a lookup acknowledgement packet from the Mobile Node in response to the lookup notification packet.

30. The method of claim 29, further comprising:

forwarding the lookup acknowledgement packet to the Home Agent.

31. The method of claim 30, further comprising:

after receiving the lookup acknowledgement,

establishing a data path between the Home Agent and the Foreign Agent, wherein the data path is used by the Home Agent to forward data packets sent to the Mobile Node from a Corresponding Node.

32. In a Foreign Agent that supports Mobile IP, a method of registering a Mobile Node, the method comprising:

determining whether the Mobile Node has been assigned an IP address using a first indicator in the registration reply packet;

when it is determined that the Mobile Node has not been assigned an IP address, updating a visitor table to indicate that the Mobile Node is visiting the Foreign Agent and forwarding the registration reply packet to the Mobile Node; and

when it is determined that the Mobile Node has been assigned an IP address, establishing a data path between the Home Agent and the Foreign Agent and forwarding the registration reply packet containing the IP address allocated to the Mobile Node, wherein the data path is used by the Home Agent to send data packets to the Mobile Node from a Corresponding Node.

33. A computer readable medium containing computer-readable instructions for looking up a Mobile Node that has previously registered with a Home Agent that supports Mobile IP, said computer readable medium comprising:

computer readable code for receiving a name lookup packet for a name lookup
5 from a lookup requester, wherein the name lookup packet includes a lookup name;

computer readable code for composing a lookup notification packet, the lookup notification packet indicating a name lookup for a Mobile Node corresponding to the lookup name in the name lookup packet has been received by the Home Agent;

computer readable code for sending the lookup notification packet to the Mobile
10 Node via a Foreign Agent;

computer readable code for receiving a lookup acknowledgement packet from the Mobile Node via the Foreign Agent, the lookup acknowledgement packet corresponding to the lookup notification packet; and

computer readable code for sending a lookup reply packet to the lookup requester
15 indicating a status of the name lookup.

34. The computer readable medium of claim 33, wherein the lookup reply packet includes an IP address assigned to the Mobile Node.

35. The computer readable medium of claim 34, wherein the lookup requester is a domain name server.

20 36. A computer system comprising:
a central processing unit; and

a memory having stored therein program instructions for looking up a Mobile Node that has previously registered with a Home Agent that supports Mobile IP, the memory comprising:

5 computer readable code for receiving a name lookup packet for a name lookup from a lookup requester wherein the name lookup packet includes a lookup name;

computer readable code for composing a lookup notification packet, the lookup notification packet indicating that a name lookup for a Mobile Node corresponding to the lookup name in the name lookup packet has been received by the Home Agent;

10 computer readable code for sending the lookup notification packet to the Mobile Node via a Foreign Agent;

computer readable code for receiving a lookup acknowledgement packet from the Mobile Node via the Foreign Agent, the lookup acknowledgement packet corresponding to the lookup notification packet; and

15 computer readable code for sending a lookup reply packet to the lookup requester indicating a status of the name lookup.

37. A computer readable medium containing computer-readable for registering a Mobile Node without assigning an IP address instructions in a Home Agent that supports Mobile IP, said computer readable medium comprising:

20 computer readable code for determining whether the Mobile Node requires an IP address using a first indicator in a registration request packet;

computer readable code for sending a registration reply packet containing a second indicator indicating that an IP address is not assigned to the Mobile Node when it is determined that the Mobile Node does not require an IP address; and

5 computer readable code for assigning an IP address to the Mobile Node and sending to the Mobile Node a registration reply packet containing the IP address when it is determined that the Mobile Node requires an IP address.

38. The computer readable medium of claim 36, further comprising:

computer readable code for receiving the registration request packet containing the first indicator from the Mobile Node.